Variation of the axillary arch muscle with multiple insertions

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ABSTRACT

Axillary arch muscles have been described as having variable and sometimes multiple insertions. We report a 90-year-old female cadaver with an axillary arch muscle that originated from the latissimus dorsi and was inserted into the pectoralis major, pectoralis minor and coracoid process. Recognising that axillary arch muscles can be present in such complex forms is important in clinical practice.

Keywords: axillary arch muscle of Langer, coracoid process, latissimus dorsi, pectoralis major muscle, pectoralis minor muscle

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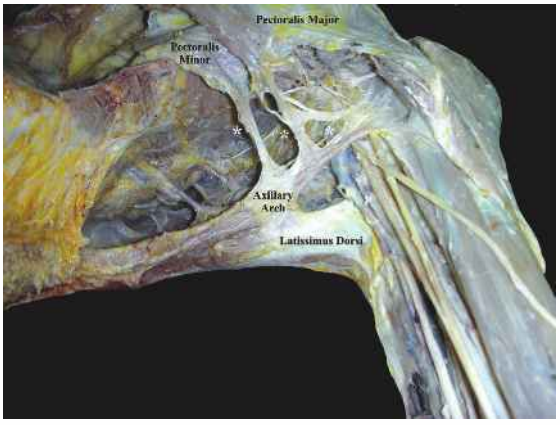

Fig. 1 Photograph shows a left axillary arch muscle with origin from the medial border of the latissimus dorsi and insertion into the coracoid process, pectoralis major and pectoralis minor.

INTRODUCTION

The axillary arch muscle (AAM), also known as Langer's muscle, axillopectoral muscle or the "Achselbogen Muskel", is a rare muscular anomaly of the axilla. It is described as a thin muscular slip extending from the latissimus dorsi to the pectoralis major. Variations of this muscular anomaly have been observed. Common cases include: the muscle adhering to the coracoid of the scapula, medial epicondyle of the humerus, teres major, long head of the triceps brachii, coracobrachialis or biceps brachii, and pectoralis minor.[1] The most commonly-described form of this muscle extends from the latissimus dorsi to the pectoralis major, the short head of the biceps brachii or to the coracoid process.[1]

The embryological origin of this muscle remains unclear.[2] The AAM has been observed both unilaterally and bilaterally. It is found to coexist in approximately one half of cases of a chondro-eptrochlearis muscle, a rare variation arising from either the pectoralis major muscle, the costal cartilages, or the aponeurosis of the external oblique muscle, and inserting it onto the medial epicondyle, intermuscular septum, or brachial fascia of the inferior arm.[3] Innervation of the AAM has also been shown to vary, providing insight as to the origin of the muscle. The nerve supply to the AAM is most commonly from either the medial pectoral nerve, or when closely connected to the latissimus dorsi, the thoracodorsal nerve.[2] The clinical significance of the AAM has been implicated as a potential cause of neurovascular compression in the cervico-axillary region, and the hyperabduction syndrome among others.[4] We report a unique case of an axillary arch with multiple insertions, an anomaly that has not been previously described in the literature.

CASE REPORT

We present the unilateral occurrence of a left AAM in a female cadaver, who was 90 years of age at death (Fig. 1). The cause of death was congestive heart failure due to severe atherosclerosis. There was no gross evident pathology or evidence of past surgical procedures involving the axilla, the shoulder or the anterior thoracic wall. The muscle was discovered during a routine faculty dissection at the Medical Gross Anatomy Laboratory in the Department of Anatomical Sciences in St. George's University School of Medicine, Grenada. The AAM was recognised as a muscular slip originating from the medial border of the left latissimus dorsi muscle, measuring 12 cm in length and 4 cm in width at its broadest point. The muscle fibres of the AAM were in direct continuity with the lateral muscle fibres of the pectoralis major muscle, pectoralis minor muscle and the coracoid process, without interruption by any type of tendinous fibres. In addition, an accessory slip was present between the slip of the AAM to the pectoralis major with the tendinous fibres to the coracoid process. The course of the AAM was directly towards the coracoid process, crossing anteriorly over the brachial plexus and axillary artery. The arterial supply of the AAM was from a single branch arising from

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Table I. The incidence of the axillary arch muscles reported in the literature.

Author (year)	No. of arches	No. of subjects	Percentage	Population
Clarys (1996)	16	183	8.7	Caucasian
Georgiev (2006)	2	56	3.6	Caucasian
Kalaycioglu (1998)	1	60	1.7	Caucasian
Kasai (1977)	10	88	11.4	Japanese
Kopsch	?	?	7–8	Caucasian
Krause (1880)	7	100	7	Caucasian
Langer (1846)	1	4	25	Caucasian
Le Double (1897)	6	95	6.3	Caucasian
MacAlister (1875)	1	16	6.25	Caucasian
Meckel (1816)	1	30	3.33	Caucasian
Merida-Velasco (2003)	3	32	9.4	Caucasian
Miguel (2001)	3	50	6	Caucasian
Nishi (1953)	?	?	11.7	Japanese
Perrin (1871)	7	29	24.14	Caucasian
Pichler (1916)	?	?	3–4	Unknown
Princeteau (1892)	25	208	12.02	Caucasian
Schramm (1984)	9	60	15	Caucasian
Serpell and Baum (1991)	4	2000	0.2	Caucasian
Struthers (1854)	8	105	7.62	Caucasian
Takafuji (1991)	3	47	6.4	Japanese
Turgut (2005)	1	26	3.8	Caucasian
Wagenseil (1927)	7	16	43.8	Chinese
Wood (1868)	6	102	5.88	Caucasian

the lateral thoracic artery. The nerve supply to the AAM was through a branch of the medial pectoral nerve, which travelled along the lateral border of the pectoralis minor to innervate the AAM proximally near its origin from the pectoralis major. Both intercostobrachial nerves were found to be unremarkable and not contributing any nerve fibres to the AAM.

DISCUSSION

Ramsay first described the AMM in 1795.[1] Testut observed what he referred to as the axillary arch of Langer in 1884,[4] while Sachatello identified this variation as the axillopectoral muscle in 1977.[5] The AAM is the most common variation of the axilla with a reported occurrence of 7%–8%. Frequencies vary from 0.25%–37.5%, depending on the population studied (Table I). Prevalence of the AAM among the Japanese has been reported at 5%–9%.[6] Recently, Georgiev et al reported the anomalous muscle in 1.8 % of the Bulgarian population.[6]

Variations of this muscle typically involve a bidirectional slip with one origin and one insertion.[1] Few cases have been described where the muscle's connections are more complex, inserting at multiple sites.[4,7] We describe a case where the AMM originated from the latissimus dorsi and had extensive branching, inserting into three of the more common sites; the pectoralis major, pectoralis minor and coracoid process.

Clinically, the AAM has been implicated in costoclavicular compression syndrome, axillary vein entrapment and median nerve entrapment.[5,8] Major thrombosis of the upper extremity was one of the earliest lesions to be associated with the AAM. Sachatello was the first to suggest a role for the AAM in the hyperabduction syndrome.[5,7] Other lesions linked to the AAM include thoracic outlet shoulder instability syndrome and lymphodermia. Aziz's report of bilateral AAM in a case of trisomy 13 points to a possible genetic basis for the formation of AAM.[9] It has been suggested that a physical examination seeking evidence of an AAM should be performed for cases of compression syndrome in the cervico-axillary region.[7] The presence of an AAM during physical examination may be detected as a palpable mass within the axilla or a loss of the typical axillary concavity.[7] However, a physical examination may not necessarily reveal all AAMs; magnetic resonance imaging may be needed for an accurate diagnosis.[7] Daniels and della Rovere have described the importance of being aware of variations of the AMM while performing lymphadenectomy for breast carcinoma, and the potential for the inadequate clearance of level 1 nodes as a result of coverage of the nodes by the AAM.[10] An understanding of the spectrum and complexity of this anatomical variation may be of benefit to any surgeon performing an axillary lymphadenectomy.

The presence of an AMM may not necessarily result in any functional deficits.[10] However, similar muscular anomalies such as the chondro-epitrochlearis have resulted in limiting arm abduction to 85°. Innervation of the AMM varies depending on the association of the AAM with other muscles. It is also possible that a muscle connecting the latissimus dorsi to the pectoralis minor, major and coracoid process, essentially covering the base of the axilla, may also serve some protective function.

The AAM usually receives its nerve supply from the medial pectoral nerve, suggesting that it is derived from the pectoral muscles. When closely associated with the latissimus dorsi, the AAM can be supplied by the thoracodorsal nerve.[2] Additional sources of innervation include the perforating branches of the second, third and sixth intercostal nerves, and the medial cutaneous nerve of the forearm.[4]

To our knowledge, an AMM with such extensive branching has not previously been reported. We were unable to prove any functional disturbances since the study was done in cadaveric material. A more thorough description of muscular anomalies of the axilla will help in gaining a better understanding of the basis of associated lesions.

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